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GENETICALLY DECREASE THE INCIDENCE OF SLP IN CANADIAN BREEDING STOCK/COMMERCIAL HOGS

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Title **Genetically Decrease the Incidence of Steatosis Like Problem (SLP) in Canadian Breeding Stock/Commercial Hogs.**

1. Introduction

Previous reports on this project have shown that SLP has a high level of heritability (h^2 0.38 – 0.49), even when corrected for fat levels (Knoll and Frith). Also in this report it was noted that the strong genetic basis for SLP indicated that a search for candidate genes and/or markers would be worth undertaking. In another report from this project it was shown that the average incidence of SLP did not decrease in the sampled population between 2001 to 2004, but the standard deviation did, showing decrease in the incidence of unacceptable marbling (Prins and Knol).

2. Results

Descriptive statistics for the uncorrected data set of dissection variables is shown in Table 1. The lines with the lowest back fat tend to have the lowest (most acceptable) ham marbling scores; this can especially be seen with Line P, which was introduced in 2005. There is little indication that ham marbling score correlates with other carcass dissection variables (Table 2). There appears to be an indication of correlation to dressed carcass weight, with heavier carcases having higher ham marbling scores. The only other slight correlation is with the ham litebutt weight, where an increase in the weight of the litebutt muscle shows a reduction in ham marbling score.

Ham marbling score was used as a trait to look for genetic markers, where 52 different markers were typed. Figure 1 shows that none of the markers significantly accounted for ham marbling score.

3. Discussion

The incidence of increased ham marbling scores (SLP) have not increased during the duration of this project, and it appears that decreasing back fat reduces the likelihood of high ham marbling scores. There is indication that ham marbling is slightly negatively correlated with the TOPIGS Selection Index (TSI) where the correlation coefficient is -0.107 ($p<0.0001$); the TSI in the lines studied is designed to select pigs with the lowest back fat, highest loin/ham muscle yield and fastest growth rate. During the period 2004–2005 the TSI had increased emphasis on reducing back fat and increasing loin/ham muscle yield.

Lack of marker relationships with ham marbling score suggests that the trait is polygenomic and would require much more detailed analysis to make progress in finding a genetic marker for SLP.

There is an economic consequence to the pig processing industry of hams with SLP, this study shows that SLP does occur in a part of the pig population, but the incidence is not increasing with time. The goal of most breeding companies is to increase the lean yield of their products and decrease back fat, this appears to be reducing the incidence of unacceptable ham marbling.

4. References

Knol, E.F. and Frith, P. Steatosis like problems and ham yield.
Prins, D.T. and Knol, E.F. Pork marbling with emphasis on steatosis like problem.

Table 1

Uncorrected means for carcass dissection variables by line for the period 2002 to 2005.

Year	2002						2003						2004		2005			
Line	B		E		S		B		E		S		E		E		P	
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
Dressed carcass weight	441	70.98	460	78.26	78	74.42	429	71.72	432	76.44	50	74.23	552	75.92	497	73.12	53	75.37
Adjusted dressed carcass weight	441	84.56	460	89.81	78	87.97	429	85.30	432	89.99	50	87.81	552	89.47	497	86.72	53	88.93
Primal cut loin weight	159	10.52	185	11.54	30	10.64	464	10.01	455	10.47	51	9.80	552	9.53	496	9.33	53	9.92
Japanese cut boneless loin weight	159	4.34	185	4.76	30	4.37	464	4.32	454	4.54	51	4.43	552	4.08	494	4.30	53	4.59
Domestic cut boneless loin weight	159	3.64	185	3.96	30	3.69	464	3.61	455	3.82	50	3.78	551	3.45	496	3.56	53	3.93
Japanese colour score (rib)	159	2.84	185	2.69	30	3.37	462	3.10	455	3.09	51	3.58	552	3.04	496	2.92	53	3.33
Japanese colour score (cut)	151	3.60	173	3.21	30	3.73	462	3.22	455	3.02	51	3.48	552	2.53	495	2.29	53	2.63
Primal cut ham weight	441	7.78	460	8.40	78	8.38	464	7.93	456	8.72	51	8.55	551	9.07	497	9.26	53	9.83
Ham inside muscle weight	441	1.69	460	1.83	48	1.93	463	1.65	456	1.83	51	1.96	550	1.85	496	1.95	53	2.24
Ham litebutt muscle weight	232	0.35	265	0.38	35	0.37	463	0.37	456	0.41	51	0.39	549	0.43	494	0.45	53	0.46
Ham outside muscle weight	441	1.62	459	1.75	78	1.88	463	1.59	456	1.79	51	1.93	550	1.83	496	1.96	53	2.33
Ham knuckle muscle weight	232	0.99	265	1.05	35	1.04	463	0.99	455	1.09	51	1.07	550	1.12	495	1.12	53	1.23
Ham marbling score (steatosis)	441	1.75	460	1.87	78	1.56	462	1.63	456	1.57	51	1.29	550	1.81	496	1.63	53	1.36
Ultrasonic back fat (mm)	223	14.23	288	15.23	43	14.11	350	15.50	405	16.17	46	13.96	541	14.55	383	13.49	41	11.55
Ultrasonic loin depth (mm)	173	57.53	231	59.90	25	59.53	217	55.22	218	57.85	46	56.24	0		293	62.52	39	65.67

Table 2

Correlation of carcass dissection variables with ham marbling score

	Correlation with Ham marbling score	P<
Dressed carcass weight	0.104	0.0001
Adjusted dressed carcass weight	0.105	0.0001
Primal cut loin weight	0.069	0.0045
Japanese cut boneless loin weight	-0.014	0.5561
Domestic cut boneless loin weight	-0.037	0.1244
Japanese colour score (rib)	-0.041	0.0900
Japanese colour score (cut)	-0.008	0.7365
Primal cut ham weight	0.044	0.0507
Ham inside muscle weight	-0.043	0.0542
Ham litebutt muscle weight	-0.104	0.0001
Ham outside muscle weight	-0.024	0.2801
Ham knuckle muscle weight	-0.032	0.1759
Ham marbling score (steatosis)	1.000	
Ultrasonic back fat (mm)	0.093	0.0002
Ultrasonic loin depth (mm)	0.037	0.3086

Figure 1
Analysis of 52 gene markers in relation to ham marbling score